Conscious perception of local elements enforces their global integration and vice versa

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GestaltReVision: Perceptual organization in the context of a dynamical and hierarchical visual brain

Introduction

To which extent do visible and perceptually suppressed stimulus parts integrate into coherent global percepts?

We performed two experiments to address this question.

In Experiment 1, the influence of a visible and invisible global context on the perceived motion direction of a visible aperture stimulus was tested.

In Experiment 2, we perceptually suppressed two elements of a bistable diamond stimulus and tested whether the suppressed elements could still influence the perception of the visible elements.

Experimental Details

Experiment 1

- 8 observers
- 160 trials
- 4 conditions
  - Context present vs. absent
  - Suppression mask present vs. absent

Experiment 2

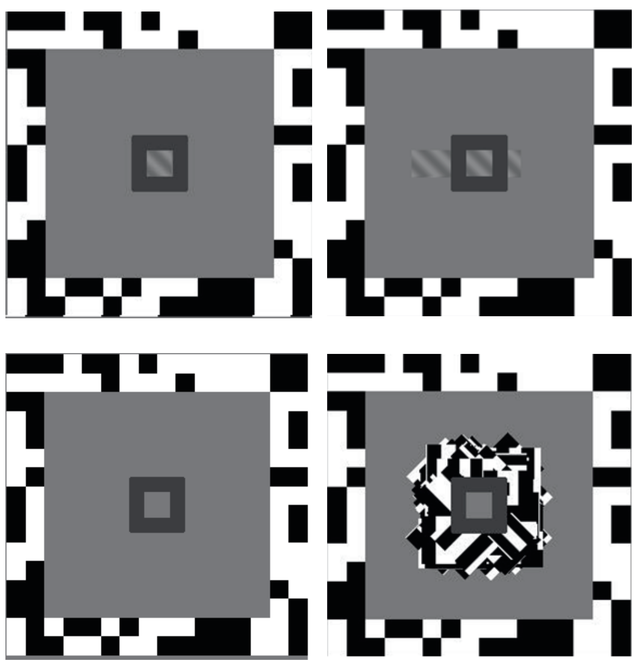
- 6 observers
- 24 trials (1min each)
- 6 conditions
  - Suppression present vs. absent
  - Lower half congruent, incongruent or absent

Experiment 1

Moving aperture stimulus with (right) and without (left) global context was always presented to the non dominant eye.

The global context could bias the perceived motion direction of the aperture in either of four directions (left, right, up, or down).

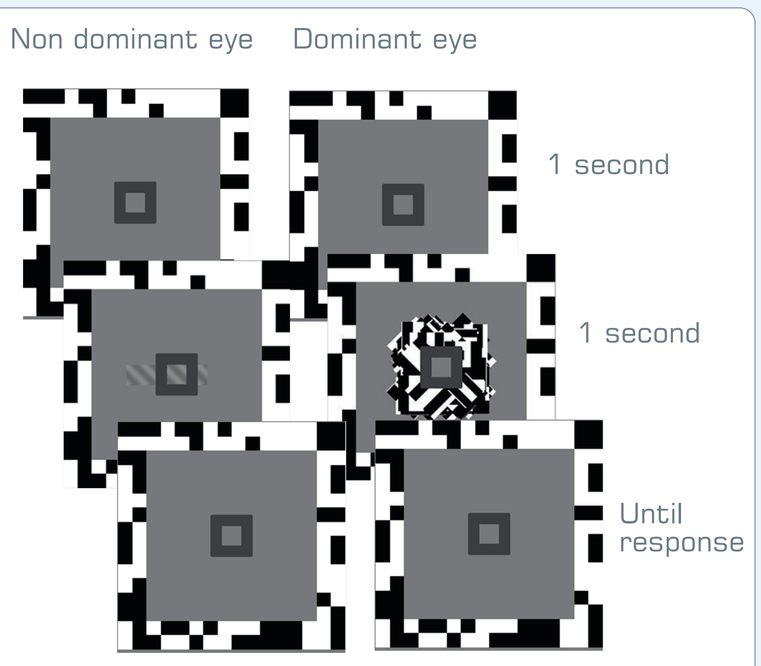
In the dominant eye, the suppression mask was either presented (right) or not (left).



On each trial, participants viewed the drifting grating within the central gray frame.

Afterwards, they had to indicate which motion direction they had perceived (8 possible directions).

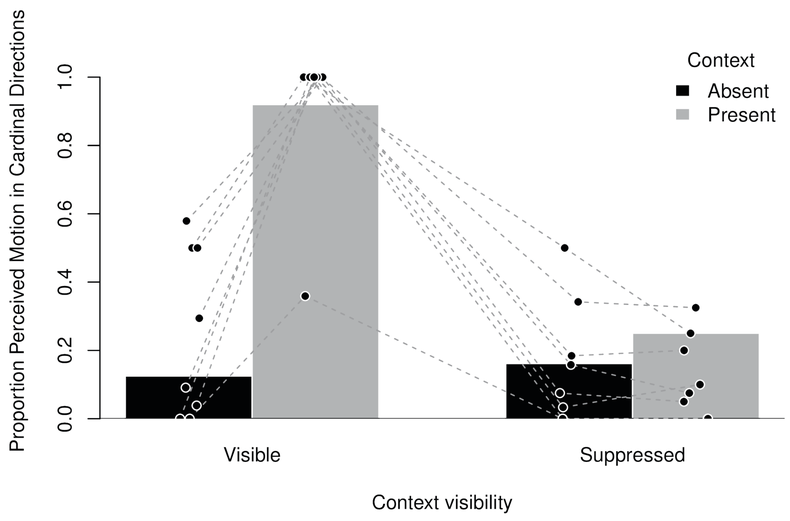
If the global context became visible during a suppression trial, participants had to indicate this using a separate response button.



Strong effect of the visible global context on the perceived motion direction of the aperture stimulus.

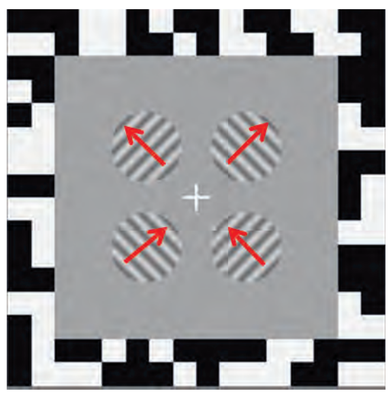
The aperture stimulus was more often perceived as moving left, right, up or downwards than without the global context.

This effect was nearly absent when the global context was perceptually suppressed.



Experiment 2

A bistable drifting grating stimulus was used that could either be perceived as four separate elements, each independently drifting in a diagonal direction, or as a diamond shape drifting upwards.



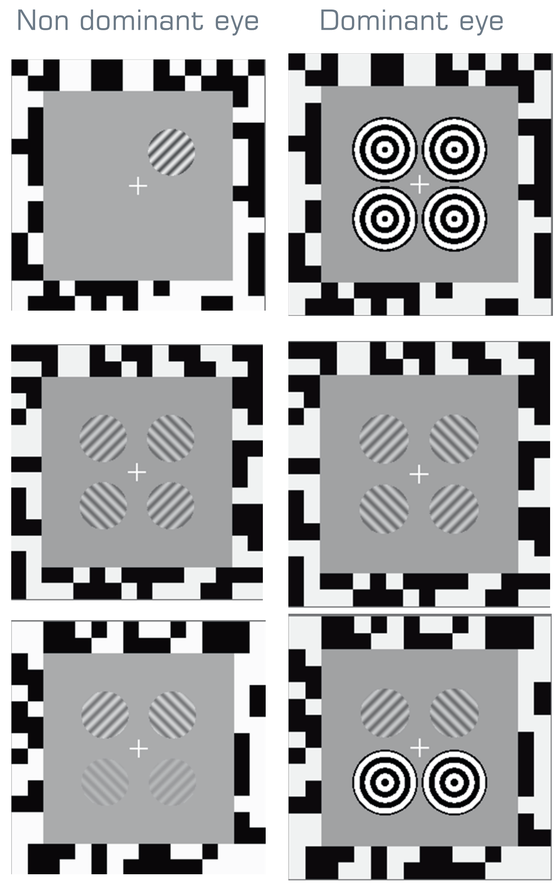
The experiment consisted of three seperate phases:

Phase 1: Determine 75% contrast threshold of grating stimulus through adaptive QUEST procedure.

Phase 2: Report percept of bistable grating stimulus for 120 seconds.

Phase 3: Report percept of upper part of the grating stimulus (upwards vs. diagonal).

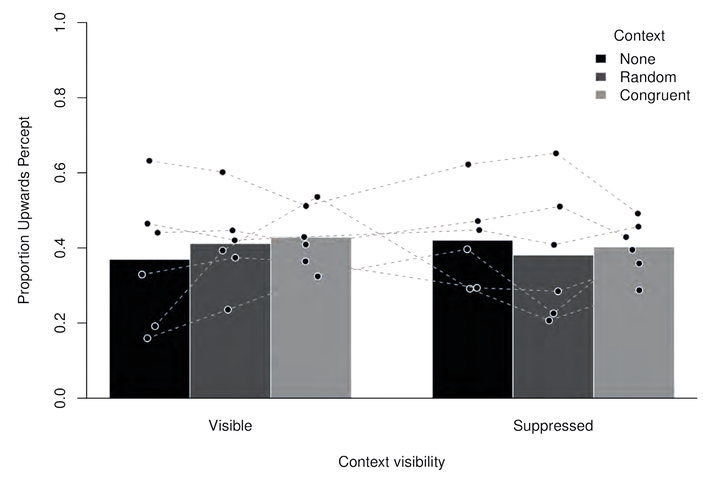
The lower half was congruent, incongruent, or not presented and either visible or invisible. It was presented intermittently (1 sec on/off) to prevent breakthrough of the gratings.



The data of 6 observers show an unclear and noisy pattern.

When the lower half was visible to participants, the congruent half did not consistently influence the proportion of upwards percepts as would be expected.

It is therefore difficult to interpret the data from the conditions in which the context was invisible.



Conclusions

No evidence for integration between visible and invisible stimulus parts in Experiment 1.

A lack of clear integration between visible stimulus parts in Experiment 2.

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CFS reference list:

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